UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/656,986	09/04/2003	Shin-Rung Lu	67,200-1145	9353

7590 06/09/2005

TUNG & ASSOCIATES
Suite 120
838 W. Long Lake Road
Bloomfield Hills, MI 48302

EXAMINER	
DOTY, HEATHER ANNE	
ART UNIT	PAPER NUMBER
2813	

DATE MAILED: 06/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/656,986	LU ET AL.	
	Examiner	Art Unit	
	Heather A. Doty	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claims 15-18 are objected to because of the following informalities: "The method of claim 1" should be changed to "The method of claim 14", otherwise claims 15-18 are identical to claims 2-5. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 6, 7, 11, 13, 14, 15, 19, and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by Pierrat et al. (U.S. 6,852,471) with Gelbart (U.S. 6,593,064) providing a definition for claim 13.

Regarding claims 1 and 2, Pierrat et al. teaches a method for exposing a blanket photoresist layer comprising providing a substrate having formed thereover a photoresist layer (column 3, lines 26-29); and exposing within a single die region within the photoresist layer a minimum of two non-overlapping (Fig. 5) die sub-patterns (phase-shifting and trim patterns, column 3, lines 26-63) while employing a minimum of two masks (column 3, lines 59-63), wherein the substrate is a semiconductor substrate (column 3, lines 26-29).

Regarding claims 6 and 7, Pierrat et al. teaches a method for exposing a photoresist layer, comprising providing a substrate having formed thereover a photoresist layer (column 3, lines 26-29); and exposing within a single die region within the photoresist layer a minimum of two non-overlapping die sub-patterns (phase-shifting and trim patterns, column 3, lines 26-63) while employing a minimum of two masks (column 3, lines 59-63) and two exposure conditions (column 2, lines 52-55), wherein the substrate is a semiconductor substrate (column 3, lines 26-29).

Regarding claim 11, Pierrat et al. teaches the method of claim 6, wherein the exposure conditions include exposure energy (dose, units of mJ/cm^2; column 7, line 3 and column 2, lines 52-55).

Regarding claim 13, exposure energy is the integral of illumination over time (Gelbart column 1, line 66 – column 2, line 6). Pierrat et al. teaches the method of claim 6, and further teaches that optical settings except exposure energy (dose) are kept constant between exposures (column 2, lines 52-55). Therefore time of exposure is kept constant, so as exposure energy (dose) varies between exposures, so does illumination.

Regarding claims 14 and 15, Pierrat et al. teaches a method for forming a patterned layer comprising providing a substrate having formed thereover a target layer (column 3, line 64 – column 4, line 2) having formed thereover a photoresist layer (column 3, lines 26-29); exposing within a single die region within the photoresist layer a minimum of two non-overlapping die sub-patterns (phase-shifting and trim patterns, column 3, lines 26-63) while employing a minimum of two masks (column 3, lines 59-

63), to form an exposed photoresist layer; developing the exposed photoresist layer to form a patterned photoresist layer; and processing the target layer to form a processed target layer while employing the patterned photoresist layer as a mask layer (column 3, line 64 – column 4, line 2), wherein the substrate is a semiconductor substrate (column 3, lines 44-46).

Regarding claim 19, Pierrat et al. teaches the method of claim 1, and further teaches employing at least two separate exposure conditions (column 2, lines 52-55).

Regarding claim 20, Pierrat et al. teaches the method of claim 19, wherein the separate exposure conditions include exposure energy (dose, units of mJ/cm^2; column 7, line 3 and column 2, lines 52-55).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 3, 8, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pierrat et al. (U.S. 6,852,471) in view of Schupp et al. (U.S. 4,596,759).

Regarding claims 3, 8, and 16, Pierrat et al. teaches the methods of claims 1, 6, and 14 (note 35 U.S.C. 102(e) rejection above), but does not teach that the substrate is a ceramic substrate.

Schupp et al. teaches a method of performing photolithography using ceramic substrates (column 13, lines 29-31).

Therefore, at the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the photolithography method taught by Pierrat and by claims 1, 6, and 14 by using a ceramic substrate, as taught by Schupp et al. The motivation for doing so at the time of the invention would have been because different devices require different types of substrates, and thin-film circuits are fabricated from ceramic substrates, as expressly taught by Schupp et al. (column 13, lines 24-31).

Claims 4, 5, 9, 10, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pierrat et al. (U.S. 6,852,471) in view of Wolf et al. (Silicon Processing for the VLSI Era, vol. 1).

Regarding claims 4, 5, 9, 10, 17, and 18, Pierrat et al. teaches the methods of claims 1, 6, and 14 (note 35 U.S.C. 102(e) rejection above), but does not specify that the photoresist is either positive or negative photoresist.

Wolf et al. teaches that positive or negative photoresist is appropriate to use in optical lithography (page 408, paragraph 2).

Therefore, at the time of the invention, it would have been obvious to one of ordinary skill in the art to perform the photolithography methods taught by Pierrat et al. and by claims 1, 6, and 14, using either positive or negative photoresist, as taught by Wolf et al. The motivation for using positive photoresist would be that it has higher resolution capabilities than negative photoresist, as expressly taught by Wolf et al. (page 408, paragraph 2). The motivation for using negative photoresist would be that it is less costly than positive photoresist, as expressly taught by Wolf et al. (page 420, second full paragraph).

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pierrat et al. (U.S. 6,852,471) in view of Kawashima (U.S. 6,780,574).

Regarding claim 12, Pierrat et al. teaches the method of claim 6 (note 35 U.S.C. 102(e) rejection above), but does not teach that the exposure conditions include depth of focus.

Kawashima teaches a multiple exposure method wherein the depth of focus for the first exposure is different from the depth of focus for the second exposure (column 7, lines 17-23).

Therefore, at the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the exposure method taught by Pierrat et al. and by claim 6 by using different depths of focus for multiple exposures, as taught by Kawashima. The motivation for doing so at the time of the invention would have been to reduce the influence of aberration to the image performance, as expressly taught by Kawashima (column 7, lines 5-7).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Heather A. Doty, whose telephone number is 571-272-8429. The examiner can normally be reached on M-F, 8:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached at 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

had